MULTIMEDIA UNIVERSITY

STUDENT IDENTIFICATION NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2017/2018

BDS 2074 – MANAGEMENT DECISION SCIENCE

(All sections / Groups)

1 JUNE 2018
9.00 a.m – 11.00 a.m
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of **FOUR (4)** pages with **FOUR (4)** Questions only.

2. Answer **ALL** the questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the Answer Booklet provided.

QUESTION 1 [25 Marks]

Mega Electronics produces two models of devices, model 110 (X_1) and model H24 (X_2). Each device for model 110 sold yields a profit of \$9 and each device for model H24 sold yields a profit of \$7. Each device for model 110 produced requires 2 hours of soldering time and 1 hour of inspection time. On the other hand, each device for model H24 produced requires 1 hour of soldering time and 3 hours of inspection time. In addition, there are 40 hours of soldering time and 30 hours of inspection time available.

a) Formulate the above problem as a linear programming problem. **[4 marks]**

b) Set up the initial simplex tableau for the above linear programming problem. **[5 marks]**

c) Determine the second simplex tableau by using simplex method. **[7 marks]**

The final tableau is given below. Use it to answer the questions that follow.

C_j →		9	7	0	0	
↓	Solution Mix	X_1	X_2	S_1	S_2	Quantity
9	X_1	0	0	3/5	-1/5	18
7	X_2	0	1	-1/5	2/5	4
	Z_j	9	7	4	1	190
	$C_j - Z_j$	0	0	-4	-1	

S_1 – slack for soldering time
S_2 – slack for inspection time

d) Determine the optimal number of devices for model 110 and model H24, respectively that should be produced. What is the maximum profit? **[3 marks]**

e) Jo is considering renting a second soldering machine at a cost to the firm of RM2.50 per hour. Should he do so? Explain. **[3 marks]**

f) Jo computes that he can hire a part-time inspector for only \$1.75 per hour. Should he do so? Explain. **[3 marks]**

Continued...

QUESTION 2 [25 Marks]

a) A firm has accumulated extra taxis at three of its leasing outlets, 1, 2 and 3. The firm also has four outlets, A, B, C and D with shortage of rental taxis. The firm wants to transfer taxis from those outlets with extras to those with shortages at the minimum total cost. The following costs of transporting these taxis from city to city have been determined:

From	**To**				SUPPLY
	A	**B**	**C**	**D**	
1	70	80	45	90	70
2	120	40	30	75	115
3	110	60	70	80	60
DEMAND	80	50	90	25	

Determine the initial solution using the **Northwest corner method** and then obtain optimal production plan by using the **Stepping stone method.**

[14 marks]

b) Given the following cost table for a an assignment problem, determine the optimal assignment and compute the total minimum cost:

	Machine			
Operator	**A**	**B**	**C**	**D**
1	$10	2	8	6
2	9	5	11	9
3	12	7	14	14
4	3	1	4	2

[11 marks]

Continued....

QUESTION 3 [25 Marks]

A project manager has decided to start a project of a new computing system and he has set up a table with the activity required as follow:

Activity	Days			Immediate Predecessors
	Optimistic	Most likely	Pessimistic	
A	4	7	10	---
B	2	10	24	A
C	8	12	16	A
D	4	9	14	A
E	1	2	3	A,B
F	6	8	22	A,B
G	2	3	4	A,C
H	2	2	2	F

a) Construct a network for this problem. **[7 marks]**

b) Determine the expected time and variance for each activity. **[4 marks]**

c) Determine earliest start time (ES), earliest finish time (EF), latest start time (LS), latest finish time (LF), and slack for each activity. **[10 marks]**

d) Determine the critical path and project completion time. **[4 marks]**

Continued....

QUESTION 4 [25 Marks]

Telco specializes in manufacturing modern telecommunication components. Tom, who is responsible for advising the CEO of Telco on telecommunication manufacturing equipment, has developed the following table concerning a proposed facility:

	Profit (RM)		
	Strong Market	Fair Market	Poor Market
Large facility	55,000	11,000	-31,000
Medium-sized facility	30,000	12,900	-10,000
Small facility	20,000	10,000	-3,200
No facility	0	0	0
Probability	0.25	0.65	0.1

Determine the best decision, using the following decision criteria:

a) Maximax **[3 marks]**
b) Maximin **[3 marks]**
c) Hurwicz criterion of realism ($\alpha = 0.6$) **[5 marks]**
d) Equally Likely **[4 marks]**
e) Minimax regret (develop an opportunity loss table) **[5 marks]**
f) Expected Monetary Value **[5 marks]**

End of paper